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**DEPARTMENT OF THE ARMY  
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Translation #1058

VIROLOGY. - Study of the inhibiting influence of certain chemical compounds on lysis induction and on the production of phages, caused by the irradiation of lysogenous Escherichia coli cultures by an ultraviolet radiation. Note (\*) of M. Michel Faguet, presented by M. Jacques Trefouel, apt. Rend. 255:1810-1812, 1962.

→ This report shows

We have studied the inhibiting influence of various chemical compounds on the lysis and the production of phages induced by an ultraviolet radiation. The result of our experiments is that adenosin 5-triphosphate was revealed as the most active substance, its anti-inductor action having been detected starting from a concentration of  $10^{-6}$  M. ( )  
C. 0.0001

A certain amount of free phages are also found in the cultures of lysogenous bacteria. A. Lwoff and A. Gutmann (1) have shown that these phages are freed by a small fraction of bacteria population. But the production of phages may be induced in the whole population of certain lysogenous stocks when cultures are exposed to convenient doses of ultraviolet radiation (A. Lwoff and aides<sup>2</sup>).

In the present work we have studied the inhibiting influence of certain chemical compounds on the production of phages and on the lysis of cultures of lysogenous bacteria submitted to doses of ultraviolet rays which determine the induction of an important number of culture germs.

Techniques. - 1° The stock which was used was the lysogenous bacteria E. coli K 12 ( $\lambda$ ). It was preserved in gelosed peptone and the liquid media were peptonized water at 3% (SC peptone), glucosized at 3%.

2° The cultures which were studied were produced in vats of the electronic microbiophotometer (3) which registered automatically the growth curves of those cultures (4).

3° The ultraviolet radiation was provided by a mercury steam lamp. The radiation dose was always the same for each irradiation, in all our experiments.

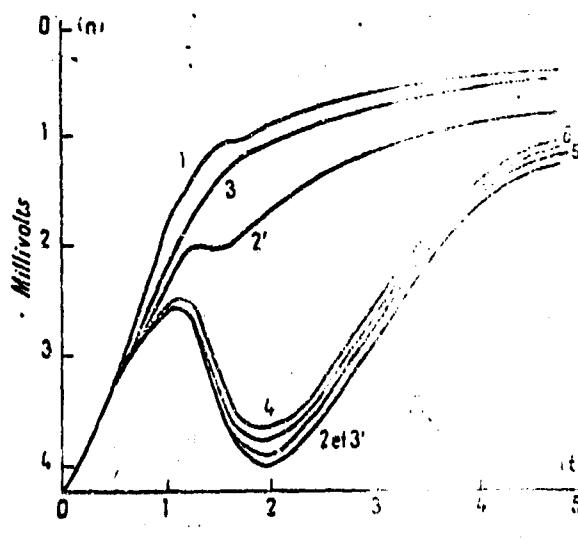
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Each irradiation was effected on 10 ml of cultures cooled to 4°C and placed in Petri bottles, and stirred during the operation.

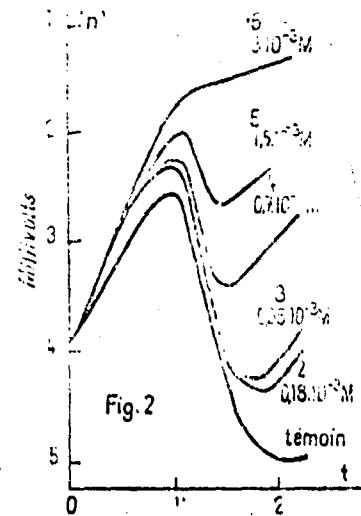
4° The products whose inhibiting influence was sought are, on the one hand, cysteine, glutathione, sodium hyposulfite and glycerol, which are already known for their protecting properties towards ionizing radiations, and, on the other hand, adenosin 5-triphosphate.

Results. - 1° The action of the above-mentioned compounds on the induction of lysis and on the production of phages of a culture of *E. coli* K 12 ( $\lambda$ ) has been studied and quantitatively measured. Our results can be summed up by the growth curves of figure I.

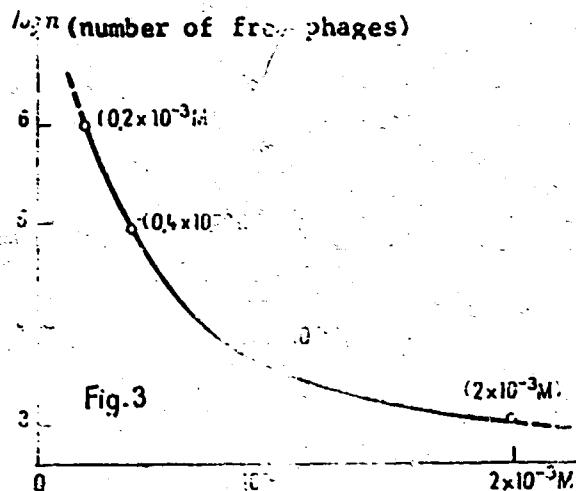
At a concentration of  $3 \cdot 10^{-3} M$ , the action of cysteine (curve 4), of glutathione (curve 5), of sodium hyposulfite (curve 6) and of glycerol (curve 3') is very weak, almost null. An examination of the lysis curves is significant. On the contrary, with the same molar concentration, ATP practically suppresses lysis (curve 3), as well as the production of phages due to irradiation. The growth curve of this culture is almost superposable to that of the control sample culture (curve 1) which was not irradiated and which shows no picture of lysis. In order to obtain an anti-inducing action with the other substances, much stronger doses, which reach, for example, in the case of glycerol, a concentration of 0.5M (curve 2').



Hours  
(fig. 1)



Hours  
(fig. 2)



ATP Concentration  
Fig. 3

<sup>2°</sup> Those comparative tests have prompted us to examine more closely the action of adonesin 5-triphosphate in growing doses, which varied from  $0.18 \text{ to } 3 \cdot 10^{-3}$ . The recordings reproduced on figure 2 (growth  $n$  in function of time  $t$ ) show the variations of the lysis of the cultures in function of the variable quantities of ATP added before irradiation. The titling of the phages freed in each culture have yielded the results which are condensed on figure 3, on which we have noted, in abscissas, the molar concentrations of ATP, and in ordinates, the logarithms of the numbers of phages freed consequently to the induction. An anti-inducing action of ATP was also noted at a weak concentration of  $10^{-4} \text{ M}$ . In order to obtain a comparable action with glycerol, for instance, it is necessary to use a concentration something like  $10^3$  times greater. The action mechanism of these various compounds will be studied in a future issue.

(\*) Seance of 1 October 1962.

- (1) A. Lwoff and A. Gutmann, Ann. Inst. Pasteur, 78, 1950, p. 711-739.
- (2) A. Lwoff, L. Siminovich and N. Kjeldgaard, Ann. Inst. Pasteur, 79, 1950, page 815-859.
- (3) This is a case of "MECI" electronic microbiophotometer.
- (4) M. Gaguet, Photoelectricity in the registration of bacteria growth, preface by J. Trefouel, Herman, Paris, 1961, No 898; M. Gaguet, Ann. Inst. Pasteur, 97, 1959, p. 177-187.

(Pasteur Institute, Service of Bacteriophage).